CLAIMS

1. A cooling system for a computer system, said computer system comprising
- at least one unit such as a central processing unit (CPU) generating thermal energy and said cooling system intended for cooling the at least one processing unit and comprising
- a reservoir having an amount of cooling liquid, said cooling liquid intended for accumulating and transferring of thermal energy dissipated from the processing unit to the cooling liquid,
- a heat exchanging interface for providing thermal contact between the processing unit and the cooling liquid for dissipating heat from the processing unit to the cooling liquid,
- a pumping means being provided as part of an integrate element, said integrate element comprising the heat exchanging interface, the reservoir and the pump,
- said pump intended for pumping the cooling liquid into the reservoir, through the reservoir and from the reservoir to a heat radiating means,
- said heat radiating means intended for radiating thermal energy from the cooling liquid, dissipated to the cooling liquid, to surroundings of the heat radiating means.

2. A cooling system according to claim 1, wherein the pump is placed inside the reservoir with at least an inlet or an outlet leading to the cooling liquid in the reservoir.

3. A cooling system according to claim 1, wherein the pump is placed outside the reservoir in the immediate vicinity of the reservoir and wherein at least an inlet or an outlet is leading directly to the cooling liquid in the reservoir.

4. A cooling system according to any of the preceding claims, wherein an inlet of the pump is positioned in immediate vicinity of the heat exchanging interface for thereby obtaining a turbulence of flow of the cooling liquid in the immediate vicinity of the heat exchanging interface.

5. A cooling system according to any of the preceding claims, wherein an outlet of the pump is positioned in immediate vicinity of the heat exchanging interface for thereby obtaining a turbulence of flow of the cooling liquid in the immediate vicinity of the heat exchanging interface.

6. A cooling system according to any of the preceding claims, wherein a pumping member of the pump is positioned in immediate vicinity of the heat exchanging interface for thereby obtaining a turbulence of flow of the cooling liquid in the immediate vicinity of the heat exchanging interface.

7. A cooling system according to any of the preceding claims, wherein the pump is selected from the following types: Bellows pump, centrifugal pump, diaphragm pump, drum pump, flexible liner pump, flexible impeller pump, gear pump, peristaltic tubing pump, piston pump, processing cavity pump, pressure washer pump, rotary lobe pump, rotary vane pump and electro-kinetic pump.

8. A cooling system according to any of the preceding claims, wherein driving means for driving the pump is selected among the following driving means: electrically operated rotary motor, piezo-electrically operated motor, permanent magnet operated motor, fluid-operated motor, capacitor-operated motor.

9. A cooling system according to any of the preceding claims, wherein one or more of the following means are provided inside the reservoir for increasing the heat absorption by the cooling liquid: channels or segments inside the reservoir, an uneven surface being provided on a physical surface of the heat exchanging interface, a heat sink with segments provided inside the reservoir and being in thermal contact with the cooling liquid.

10. A cooling system according to any of the preceding claims, where the heat exchanging interface is a heat exchanging surface being in close thermal contact with the processing unit for dissipating heat from the processing unit to the cooling liquid via the heat exchanging surface.

11. A cooling system according to any of the preceding claims, where the heat exchanging interface is a free surface of the processing unit, said free surface of the processing unit having direct access to the cooling liquid for dissipating heat from the processing unit directly to the cooling liquid,

12. A cooling system for a computer system, said computer system comprising
- at least one unit such as a central processing unit (CPU) generating thermal energy and said cooling system intended for cooling the at least one processing unit and comprising
- a reservoir having an amount of cooling liquid for accumulating and transferring of thermal energy dissipated from the processing unit to the cooling liquid,
- a heat exchanging interface for providing thermal contact between the processing unit and the cooling liquid for dissipating heat from the processing unit to the cooling liquid,
- a pump intended for pumping the cooling liquid into the reservoir, through the reservoir and from the reservoir to a heat radiating means,
- said cooling system being intended for thermal contact with the processing unit by means of existing fastening means associated with the processing unit, and

- said heat radiating means intended for radiating from the cooling liquid thermal energy, dissipated to the cooling liquid, to surroundings of the heat radiating means.

13. A cooling system according to claim 12, wherein the existing fastening means are means intended for attaching a heat sink to the processing unit.

14. A cooling system according to claim 12, wherein the existing fastening means are means intended for attaching a cooling fan to the processing unit.

15. A cooling system according to claim 12, wherein the existing fastening means are means intended for attaching a heat sink together with a cooling fan to the processing unit.

16. A cooling system according to any of claims 12-15, wherein the pump is selected from the following types: Bellows pump, centrifugal pump, diaphragm pump, drum pump, flexible liner pump, flexible impeller pump, gear pump, peristaltic tubing pump, piston pump, processing cavity pump, pressure washer pump, rotary lobe pump, rotary vane pump and electro-kinetic pump.

17. A cooling system according to any of claims 12-16, wherein driving means for driving the pump is selected among the following driving means: electrically operated rotary motor, piezo-electrically operated motor, permanent magnet operated motor, fluid-operated motor, capacitor-operated motor.

18. A cooling system according to any of claims 12-17, wherein one or more of the following means are provided inside the reservoir for increasing the heat absorption by the cooling liquid: channels or segments inside the reservoir, an uneven surface being provided on a physical surface of the heat exchanging interface, a heat sink with segments provided inside the reservoir and being in thermal contact with the heat exchanging surface.

19. A cooling system according to any of claims 12-18, where the heat exchanging interface is a heat exchanging surface being in close thermal contact with the processing unit for dissipating heat from the processing unit to the cooling liquid via the heat exchanging surface.

20. A cooling system according to any of claims 12-18, where the heat exchanging interface is a free surface of the processing unit, said free surface of the processing unit

having direct access to the cooling liquid for dissipating heat from the processing unit directly to the cooling liquid,

21. A cooling system for a computer system, said computer system comprising
- at least one unit such as a central processing unit (CPU) generating thermal energy and said cooling system intended for cooling the at least one processing unit and comprising
- a reservoir having an amount of cooling liquid for accumulating and transferring of thermal energy dissipated from the processing unit to the cooling liquid,
- a heat exchanging interface for providing thermal contact with the processing unit and the cooling liquid for dissipating heat from the processing unit to the cooling liquid,
- a pump intended for pumping the cooling liquid into the reservoir, through the reservoir and from the reservoir to a heat radiating means, and
- said cooling system further comprising a pump wherein the pump is driven by an AC electrical motor powered by a DC electrical power supply of the computer system,
- where at least part of the electrical power from said power supply is intended for being converted to AC being supplied to the electrical motor.

22. A cooling system according to claim 21, wherein the pump is selected from the following types: Bellows pump, centrifugal pump, diaphragm pump, drum pump, flexible liner pump, flexible impeller pump, gear pump, peristaltic tubing pump, piston pump, processing cavity pump, pressure washer pump, rotary lobe pump, rotary vane pump and electro-kinetic pump.

23. A cooling system according to claim 21 or 22, wherein one or more of the following means are provided inside the reservoir for increasing the heat absorption by the cooling liquid: channels or segments inside the reservoir, an uneven surface being provided on a physical surface of the heat exchanging interface, a heat sink with segments provided inside the reservoir and being in thermal contact with the heat exchanging surface.

24. A cooling system according to any of claims 21-23, where the heat exchanging interface is a heat exchanging surface being in close thermal contact with the processing unit for dissipating heat from the processing unit to the cooling liquid via the heat exchanging surface.

25. A cooling system according to any of the claims 21-23, where the heat exchanging interface is a free surface of the processing unit, said free surface of the processing unit having direct access to the cooling liquid for dissipating heat from the processing unit directly to the cooling liquid,

26. A cooling system according to any of the claims 1-25, wherein a motor is intended both for driving the pump for pumping the cooling liquid and for driving a fan for establishing a flow of air in the vicinity of the reservoir.

27. A cooling system according to any of the claims 1-25, wherein a motor is intended both for driving the pump for pumping the cooling liquid and for driving a fan for establishing a flow of air in the vicinity of the heat radiating means.

28. A cooling system according to any of the claims 1-25, wherein a motor is intended both for driving the pump for pumping the cooling liquid, and for driving the a fan for establishing a flow of air in the vicinity of the reservoir, and for driving a fan for establishing a flow of air in the vicinity of the heat radiating means.

29. A cooling system according to any of the preceding claims, wherein the heat exchanging interface is an element being separate from the reservoir, and where the heat exchanging interface is secured to the reservoir in a manner so that the heat exchanging interface constitutes part of the reservoir when being secured to the reservoir.

30. A cooling system according to any of claims 1-28, wherein the heat exchanging interface constitutes an integrate part of the reservoir, and where the heat exchanging interface extends along an area of a surface of the reservoir, said area of surface being intended for facing the processing unit and said area of surface being intended for close thermal contact with the processing unit.

31. A cooling system according to any of claims 1-28, wherein the heat exchanging interface is constituted between a free surface of the processing unit and the cooling liquid in the reservoir, and where the heat exchanging interface is capable of establishing the close thermal contact with the processing unit through an aperture provided in the reservoir, and where the aperture extends along an area of the surface of the reservoir, said area of surface being intended for facing the processing unit.

32. A cooling system according to any of the preceding claims wherein said heat exchanging interface has an surface facing said reservoir, and said inside surface being substantially plane.

33. A cooling system for a computer system, said computer system comprising
- at least one unit such as a central processing unit (CPU) generating thermal energy and said cooling system intended for cooling the at least one processing unit comprising

- a reservoir having an amount of cooling liquid, said cooling liquid intended for accumulating and transferring of thermal energy dissipated from the processing unit to the cooling liquid,
- a heat exchanging interface for providing thermal contact between the processing unit and the cooling liquid for dissipating heat from the processing unit to the cooling liquid,
- a pumping means being intended for pumping the cooling liquid into the reservoir, through the reservoir and from the reservoir to a heat radiating means,
- said heat radiating means intended for radiating thermal energy from the cooling liquid, dissipated to the cooling liquid, to surroundings of the heat radiating means,- said heat exchanging interface being manufactured from a material suitable for heat conducting, and
- with a first side of the heat exchanging interface facing the central processing unit being substantially plane and
- with a second side of the heat exchanging interface facing the cooling liquid being substantially plane and
- said reservoir being manufactured from plastic, and channels or segments being provided in the reservoir for establishing a certain flow-path for the cooling liquid through the reservoir.

34. A cooling system according to claim 33, wherein said pumping means is provided as part of an integrate element, said integrate element comprising the heat exchanging interface, the reservoir and the pumping means. 35. A cooling system according to claim 33 or 34, wherein an inlet of said pumping means is positioned in immediate vicinity of the heat exchanging interface for thereby obtaining a turbulence of flow of the cooling liquid in the immediate vicinity of the heat exchanging interface.

36. A cooling system according to claim 33 or 34, wherein an outlet of said pumping means is positioned in immediate vicinity of the heat exchanging interface for thereby obtaining a turbulence of flow of the cooling liquid in the immediate vicinity of the heat exchange interface.

37. A cooling system according to claim 33 or 34, wherein a pumping member of said pumping means is positioned in immediate vicinity of the heat exchanging interface for thereby obtaining a turbulence of flow of the cooling liquid in the immediate vicinity of the heat exchanging interface.

38. A cooling system according to any of claims 33-37, wherein the pumping means is selected from the following types: Bellows pump, centrifugal pump, diaphragm pump, drum pump, flexible liner pump, flexible impeller pump, gear pump, peristaltic tubing

pump, piston pump, processing cavity pump, pressure washer pump, rotary lobe pump, rotary vane pump and electro-kinetic pump.

39. A cooling system according to any of claims 33-38, wherein driving means for driving the pump is selected among the following driving means: electrically operated rotary motor, piezo-electrically operated motor, permanent magnet operated motor, fluid-operated motor, capacitor-operated motor.

40. A cooling system according to any of claims 33-39, wherein said pumping means is driven by an AC electrical motor by a DC electrical power supply of the computer system, wherein at least part of the electrical power from said power supply is intended for being converted to AC being supplied to the electrical motor.

41. A cooling system according to any of claims 33-40, where the heat exchanging interface is a heat exchanging surface being in close thermal contact with the processing unit for dissipating heat from the processing unit to the cooling liquid via the heat exchanging surface.

42. A cooling system according to any of claims 33-40, where the heat exchanging interface is a free surface of the processing unit, said free surface of the processing unit having direct access to the cooling liquid for dissipating heat from the processing unit directly to the cooling liquid,

43. A cooling system for a computer system, said computer system comprising
- at least one unit such as a central processing unit (CPU) generating thermal energy and said cooling system intended for cooling the at least one processing unit comprising
- at least one liquid reservoir mainly for dissipating or radiating heat, said heat being accumulated and transferred by said cooling liquid,
- said cooling system being adapted such as to provide transfer of said heat from a heat dissipating interface to a heat radiating surface where
- said at least one liquid reservoir being provided with one aperture intended for being closed by placing said aperture covering part of, alternatively covering the whole of, the at least one processing unit in such a way that a free surface of the processing unit is in direct heat exchanging contact with an interior of the reservoir, and thus in direct heat exchanging contact with the cooling liquid in the reservoir, through the aperture.

44. A cooling system for a computer system according to claim 43, wherein the aperture of the reservoir is intended for being closed by attaching boundaries of said aperture to a free surface of a the processing unit.

45. A cooling system for a computer system according to claim 43, wherein the aperture of the reservoir is intended for being closed by attaching boundaries of said aperture along boundaries of a free surface of the processing unit.

46. A cooling system for a computer system according to claim 43, wherein the aperture of the reservoir is intended for being closed by attaching boundaries of said aperture to a free surface of a heat sink.

47. A cooling system for a computer system according to claim 43, wherein the aperture of the reservoir is intended for being closed by attaching boundaries of said aperture along boundaries of a free surface of a heat sink.

48. A cooling system according to claim 43, wherein
- a first reservoir is intended for being closed by attaching boundaries of an aperture in the first reservoir to, alternatively along, a free surface of a said processing unit and wherein
- a second reservoir is intended for being closed by attaching boundaries of an aperture in the second reservoir to, alternatively along, a free surface of a to a free surface of a heat sink, and where
- liquid conducting means are provided between the first reservoir and the second reservoir.

49. A cooling system according to claim 43, wherein a first reservoir is closed by attaching said first reservoir to a heat exchanging surface element being in close thermal contact with the processing unit, said heat exchanging surface intended for dissipating heat from the processing unit to cooling liquid in the first reservoir, and wherein a second reservoir is closed by attaching said second reservoir to a surface of a heat sink, said heat sink intended for radiating heat from cooling liquid in the second reservoir to the exterior surroundings.

50. A cooling system according to claim 48 or 49, wherein said first reservoir and said second reservoir are provided as a monolithic structure comprising both the first reservoir and the second reservoir and where both a heat dissipation from the processing unit to the cooling liquid in the first reservoir and heat radiation from the cooling liquid in the second reservoir to exterior surrounding is provided by the monolithic structure.

51. A cooling system according to claim 50, wherein said monolithic structure is manufactured at least partly from plastic, preferably is manufactured fully in plastic, and said monolithic structure being manufactured by injection moulding.

52. A cooling system according to any of claims 43-51, wherein transfer of said cooling liquid from an outlet of the first reservoir to an inlet of the second reservoir, and from an outlet of the second reservoir to an inlet of the first reservoir, and circulating the cooling liquid within said liquid conducting means is provided by a pumping means being intended for pumping the cooling liquid.

53. A cooling system according to any of claims 43-52 wherein one of said reservoirs of said monolithic structure comprises said pumping means.

54. A cooling system according to claim 52 or 53, wherein an inlet and/or an outlet and/or a pumping member of said pumping means, is provided in the vicinity of said substantially plane side in order to provide a turbulence of flow and hereby improve the exchange of heat between said cooling liquid and substantially plane side.

55. A cooling system according to claim 54, wherein an inlet of the pumping means is provided within the first reservoir and the outlet is provided within the second reservoir.

56. A cooling system according to any of the claims 43-55, wherein the pump is selected from the following types: Bellows pump, centrifugal pump, diaphragm pump, drum pump, flexible liner pump, flexible impeller pump, gear pump, peristaltic tubing pump, piston pump, processing cavity pump, pressure washer pump, rotary lobe pump, rotary vane pump and electro-kinetic pump.

57. A cooling system according to any of the claims 43-56, wherein driving means for driving the pump is selected among the following driving means: electrically operated rotary motor, piezo-electrically operated motor, permanent magnet operated motor, fluid-operated motor, capacitor-operated motor.

58. A cooling system according to any of claims 43-57, wherein said pumping means is driven by an AC electrical motor by a DC electrical power supply of the computer system, wherein at least part of the electrical power from said power supply is intended for being converted to AC being supplied to the electrical motor.

59. A cooling system according to any of claims 43-58, wherein one or more of the following means are provided inside the reservoir for increasing the heat absorption by the cooling liquid: channels or segments inside the reservoir, an uneven surface being provided on a physical surface of the heat exchanging interface, a heat sink with segments

provided inside the reservoir and being in thermal contact with the heat exchanging interface.

60. A cooling system according to any of claims 43-59, wherein an electrical motor is intended both for driving the pump for pumping the cooling liquid through the reservoir and for driving a fan for establishing a flow of air around the reservoir.

61. A cooling system according to any of claims 43-59, wherein an electrical motor is intended both for driving the pump for pumping the cooling liquid through the reservoir and for driving a fan for establishing a flow of air along heat radiating means.

62. A cooling system according to any of claims 43-59, wherein an electrical motor is intended both for driving the pump for pumping the cooling liquid through the reservoir, and for driving a fan for establishing a flow of air around the reservoir, and for driving a fan for establishing a flow of air along heat radiating means.

63. A method of cooling a computer system comprising at least one unit such as a central processing unit (CPU) generating thermal energy and said method utilising a cooling system for cooling the at least one processing unit and, said cooling system comprising
- a reservoir
- at least one heat exchanging interface
- an air blowing fan
- a pumping means

said method of cooling comprising the steps of

- applying one of the following possibilities of how to operate the computer system: establishing, or defining, or selecting an operative status of the computer system
- controlling the operation of at least one of the following means of the computer system; the pumping means and the air blowing fan in response to at least one of the following parameters; a surface temperature of the heat generating processing unit, an internal temperature of the heat generating processing unit, or a processing load of the CPU and
- in accordance with the operative status being established, defined or selected, controlling the operation of the computer system in order to achieve at least one of the following conditions; a certain cooling performance of the cooling system, a certain electrical consumption of the cooling system, a certain noise level of the cooling system.

64. A method according to claim 63 for cooling a computer system, wherein the operation of the air blowing fan is controlled before any control of the operation of the pumping means in order to achieve the at least one selected condition of the cooling system.

65. A method according to claim 63 or 64 for cooling a computer system, wherein said computer system further comprises an operative system or an alike means comprising a means for measuring the CPU load and/or the CPU temperature, and wherein said method of cooling said CPU further comprises the step of
- using a measurement, performed by said BIOS or alike means, of the CPU load and/or the CPU temperature for controlling said cooling system.

66. A method according to claim 63 for cooling a computer system, wherein said cooling system further comprises a temperature measuring means for measuring a temperature of the CPU, and wherein said method of cooling said CPU further comprises the step of
- using a measurement, performed by said temperature measurement means, of the CPU temperature for controlling said cooling system.

67. A method for cooling a computer system, wherein said cooling system further comprises a pumping means with an impeller for pumping the cooling liquid through a pumping housing, said pumping means being driven by an AC electrical motor with a stator and a rotor, and said pumping means being provided with a means for sensing a position of the rotor, and wherein the method comprises the following steps- initially establishing a preferred rotational direction of the rotor of the electrical motor
- before start of the electrical motor, sensing the angular position of the rotor
- during start, applying an electrical AC voltage to the electrical motor and selecting the signal value, positive or negative, of the AC voltage at start of the electrical motor
- said selection being made according to the preferred rotational direction, and
- said application of the AC voltage being performed by the computer system for applying the AC voltage from the electrical power supply of the computer system during conversions of the electrical DC voltage of the power supply to AC voltage for the electrical motor.

68. A method according to claim 67, where sensing the angular position of the rotor is accomplished by a number Hall-sensors placed at angular intervals for detection of the rotor's magnetic poles, the number of sensors corresponding to the number of magnetic poles establishing the mechanical angle, and corresponding to the electrical angle.

69. A method according to claim 67 or claim 68, where application of the electrical AC voltage to the electrical motor and selection of the signal value, positive or negative, of the

AC voltage at start of the electrical motor is accomplished by the operating system of the computer system and is communicated to an DC/AC converter of the computer system.